

- [54] **LASER TISSUE WELDING CONTROL SYSTEM**
- [75] Inventors: **Dix P. Poppas; Steven M. Schlossberg; Theodore J. Choma; Scott D. Klioze**, all of c/o Laserscope Surgical Systems 3052 Orchard Dr., San Jose, Calif. 95134-2011; **James H. Boll**, San Francisco, Calif.
- [73] Assignees: **Dix Phillip Poppas; Steven Mark Schlossberg; Theodore John Choma; Scott David Klioze**
- [21] Appl. No.: **886,779**
- [22] Filed: **May 21, 1992**
- [51] Int. Cl.⁵ **A61N 5/06**
- [52] U.S. Cl. **606/12; 606/8; 606/9; 606/10**
- [58] Field of Search **128/395, 396, 397, 398; 606/9, 10, 11, 12, 13, 16, 3, 8; 600/1, 2**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,316,467	2/1982	Muckerheide	606/12
4,672,969	6/1987	Dew	128/397
4,854,320	8/1989	Dew et al.	128/397
4,884,568	12/1989	Hahn	127/397
4,950,268	8/1990	Rink	606/12
4,994,059	2/1991	Kosa et al.	606/12
5,002,051	3/1991	Dew et al.	128/395
5,050,597	9/1991	Daikuzono	128/395
5,057,099	10/1991	Rink	128/398
5,071,417	12/1991	Sinofsky	128/398

OTHER PUBLICATIONS

Morden et al. "Development of Controlled ND:YAG Laser for Medical Applications" Medical Instru., Aug. 1987, pp. 222-225.

Poppas et al. "Laser Welding in Urethral Surgery: Im-

proved Results with a Protein Solder," The Journal of Urology, Feb. 1988, pp. 415-417.

Ganesan et al., "Urethral Reconstruction Using the Carbon Dioxide Laser: An Experimental Evaluation", The Journal of Urology, Oct. 1989, pp. 1139-1141.

Schlossberg et al. "Tissue Welding with Lasers," Seminars in Urology, Aug. 1991, pp. 206-209.

DaiKuzono et al., "Laserthermia: A New Computer Controlled Contact Nd:YAG System for Interstitial Local Hypothermia," Lasers in Surgery and Medicine, 1988, pp. 254-258.

Schlossberg et al., "CO₂ Laser Microsurgery and Welding," Lasers and Urologic Surgery, Joseph A. Smith et al., 1989.

Primary Examiner—Stephen C. Pellegrino

Assistant Examiner—M. Peffley

Attorney, Agent, or Firm—Killworth, Gottman, Hagan & Schaeff

[57] **ABSTRACT**

A system for welding tissue by irradiation with laser energy, includes a laser for generating a beam of laser energy and directing the beam toward the tissue so as to irradiate the region to be welded. The laser has a control input and is responsive to a control signal supplied to said control input to adjust the power of the beam of laser energy. An infrared sensor senses the temperature of the tissue in the region to be welded by sensing infrared radiation coming from this region. The sensor provides a sensor output indicative of the temperature. A computer control arrangement is responsive to the sensor output. The computer control arrangement supplies a control signal to said laser such that the region to be welded is heated to a predetermined temperature.

8 Claims, 6 Drawing Sheets

